```
GAATTCCAGTGTGCTGGCTTCCTCACCTGCAGCACAGCACACTCCTTTGGGCAAGGACCTGAGACCCTTGTGCTAAGTC

                                                                    1
                                                                   MET ILE PHE PRO TRP LYS CYS
AAGAGGCTCAATGGGCTGCAGAAGAACTAGAGAAGGACCAAGCAAAGCC                 ATG ATA TTT CCA TGG AAA TGT

          10                                                  20                SIGNAL SEQUENCE
GLN SER THR GLN ARG ASP LEU TRP ASN ILE PHE LYS [LEU TRP GLY TRP THR MET LEU CYS
CAG AGC ACC CAG AGG GAC TTA TGG AAC ATC TTC AAG [TTG TGG GGG TGG ACA ATG CTC TGT

          30                                                  PROBABLE N-TERMINUS
CYS ASP PHE LEU ALA] HIS HIS GLY THR TYR CYS TRP THR TYR HIS TYR SER GLU LYS PRO
TGT GAT TTC CTG GCA] CAT CAT GGA ACC TAC TGC TGG ACT TAC CAT TAT TCT GAA AAA CCC

          50                                                  60
MET ASN TRP GLN ARG ALA ARG ARG PHE CYS ARG ASP ASN TYR THR ASP LEU VAL ALA ILE
ATG AAC TGG CAA AGG GCT AGA AGA TTC TGC CGA GAC AAT TAC ACA GAT TTA GTT GCC ATA

          70                                                  80
GLN ASN LYS ALA GLU ILE GLU TYR LEU GLU LYS THR LEU PRO PHE SER ARG SER TYR TYR
CAA AAC AAG GCG GAA ATT GAG TAT CTG GAG AAG ACT CTG CCC TTC AGT CGT TCT TAC TAC

          90                                                  100
TRP ILE GLY ILE ARG LYS ILE GLY GLY ILE TRP THR TRP VAL GLY THR ASN LYS SER LEU
TGG ATA GGA ATC CGG AAG ATA GGA GGA ATA TGG ACG TGG GTG GGA ACC AAC AAA TCT CTC

          110                                                 120
THR GLU GLU ALA GLU ASN TRP GLY ASP GLY GLU PRO ASN ASN LYS LYS ASN LYS GLU ASP
ACT GAA GAA GCA GAG AAC TGG GGA GAT GGT GAG CCC AAC AAC AAG AAG AAC AAG GAG GAC

          130                                                 140
CYS VAL GLU ILE TYR ILE LYS ARG ASN LYS ASP ALA GLY LYS TRP ASN ASP ASP ALA CYS
TGC GTG GAG ATC TAT ATC AAG AGA AAC AAA GAT GCA GGC AAA TGG AAC GAT GAC GCC TGC

          150                                                 160
HIS LYS LEU LYS ALA ALA LEU CYS TYR THR ALA SER CYS GLN PRO TRP SER CYS SER GLN
CAC AAA CTA AAG GCA GCC CTC TGT TAC ACA GCT TCT TGC CAG CCC TGG TCA TGC AGT GCC
```

FIG. 1A

```
          170                                                 180
HIS GLY GLU [CYS] VAL GLU ILE ILE ASN [ASN HIS THR] [CYS] ASN [CYS] ASP VAL GLY TYR TYR
CAT GGA GAA [TGT] GTA GAA ATC ATC AAT [AAT CAC ACC] [TGC] AAC [TGT] GAT GTG GGG TAC TAT

          190                                                 200
GLY PRO GLN [CYS] GLN LEU VAL ILE GLN [CYS] GLU PRO LEU GLU ALA PRO GLU LEU GLY THR
GGG CCC CAG [TGT] CAG CTT GTG ATT CAG [TGT] GAG CCT TTG GAG GCC CCA GAG CTG GGT ACC

          210                                                 220
MET ASP [CYS] THR HIS PRO PHE GLY [ASN PHE SER] PHE SER SER GLN [CYS] ALA PHE SER [CYS]
ATG GAC [TGT] ACT CAC CCC TTT GGA [AAC TTC AGC] TTC AGC TCA CAG [TGT] GCC TTC AGC [TGC]

          230                                                 240
SER GLU GLY THR [ASN LEU THR] GLY ILE GLU GLU THR THR [CYS] GLY PRO PHE GLY [ASN TRP]
TCT GAA GGA ACA [AAC TTA ACT] GGG ATT GAA GAA ACC ACC [TGT] GGA CCA TTT GGA [AAC TGG]

          250                                                 260
[SER] SER PRO GLU PRO THR [CYS] GLN VAL ILE GLN [CYS] GLU PRO LEU SER ALA PRO ASP LEU
[TCA] TCT CCA GAA CCA ACC [TGT] CAA GTG ATT CAG [TGT] GAG CCT CTA TCA GCA CCA GAT TTG

          270                                                 280
GLY ILE MET [ASN] [CYS] [SER] HIS PRO LEU ALA SER PHE SER PHE THR SER ALA [CYS] THR PHE
GGG ATC ATG [AAC] [TGT] [AGC] CAT CCC CTG GCC AGC TTC AGC TTT ACC TCT GCA [TGT] ACC TTC

          290                                                 300
ILE [CYS] SER GLU GLY THR GLU LEU ILE GLY LYS LYS LYS THR ILE [CYS] GLU SER SER GLY
ATC [TGC] TCA GAA GGA ACT GAG TTA ATT GGG AAG AAG AAA ACC ATT [TGT] GAA TCA TCT GGA

          310                                                 320
ILE TRP SER [ASN PRO SER] PRO ILE [CYS] GLN LYS LEU ASP LYS SER PHE SER MET ILE LYS
ATC TGG TCA [AAT CCT AGT] CCA ATA [TGT] CAA AAA TTG GAC AAA AGT TTC TCA ATG ATT AAG

          330                                                 340   STOP TRANSFER SEQUENCE
GLU GLY ASP TYR ASN PRO LEU PHE ILE PRO VAL ALA VAL MET VAL THR ALA PHE SER GLY
GAG GGT GAT TAT AAC CCC CTC TTC ATT CCA GTG GCA GTC ATG GTT ACT GCA TTC TCT GGG
```

FIG. 1B

```
        350                                                 360
LEU ALA PHE ILE ILE TRP LEU ALA ARG ARG LEU LYS LYS GLY LYS LYS SER LYS ARG SER
TTG GCA TTT ATC ATT TGG CTG GCA AGG AGA TTA AAA AAA GGC AAG AAA TCC AAG AGA AGT
●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●●

        370     372
MET ASN ASP PRO TYR OC
ATG AAT GAC CCA TAT TAA ATCGCCCTTGGTGAAAGAAAATTCTTGGAATACTAAAAATCATGAGATCCTTTA

AATCCTTCCATGAAACGTTTTGTGTGGTGGCACCTCCTACGTCAAACATGAAGTGTGTTCCTTCAGTGCATCTGGGAA

GATTTCTACCCGACCAACAGTTCCTTCAGCTTCCATTTCGCCCCTCATTTATCCCTCAACCCCCAGCCCACAGGTGTT

TATACAGCTCAGCTTTTTGTCTTTTCTGAGGAGAAACAAATAAGACCATAAGGGAAAGGATTCATGTGGAATATAAAG

ATGGCTGACTTTGCTCTTTCTTGACTCTTGTTTTCAGTTTCAATTCAGTGCTGTACTTGATGACAGACACTTCTAAAT

GAAGTGCAAATTTGATACATATGTGAATATGGACTCAGTTTTCTTGCAGATCAAATTTCACGTCGTCTTCTGTATACT

GTGGAGGTACACTCTTATAGAAAGTTCAAAAAGTCTACGCTCTCCTTTCTTTCTAACTCCAGTGAAGTAATGGGGTCC

TGCTCAAGTTGAAAGAGTCCTATTTGCACTGTAGCCTCGCCGTCTGTGAATTGGACCATCCTATTTAACTGGCTTCAG

GCCTCCCCACCTTCTTCAGCCACCTCTCTTTTTCAGTTGGCTGACTTCCACACCTAGCATCTCATGAGTGCCAAGCAA

AAGGAGAGAAGAGAGAAATAGCCTGCGCGGTTTTTTAGTTTGGGGGTTTTGCTGTTTCCTTTTATGAGACCCATTCCT

ATTTCTTATAGTCAATGTTTCTTTTATCACGATATTATTAGTAAGAAAACATCACTGAAATGCTAGCTGCAAGTGACA

TCTCTTTGATGTCATATGGAAGAGTTAAAACAGGTGGAGAAATTCCTTGATTCACAATGAAATGCTCTCCTTTCCCCT

GCCCCCAGAACTTTTATCCACTTACCTAGATTCTACATATTCTTTAAATTTCATCTCAGGCCTCCCTCAACCCCACGG

GGCCGCCAGCACACTGGAATTC
```

FIG. 1C

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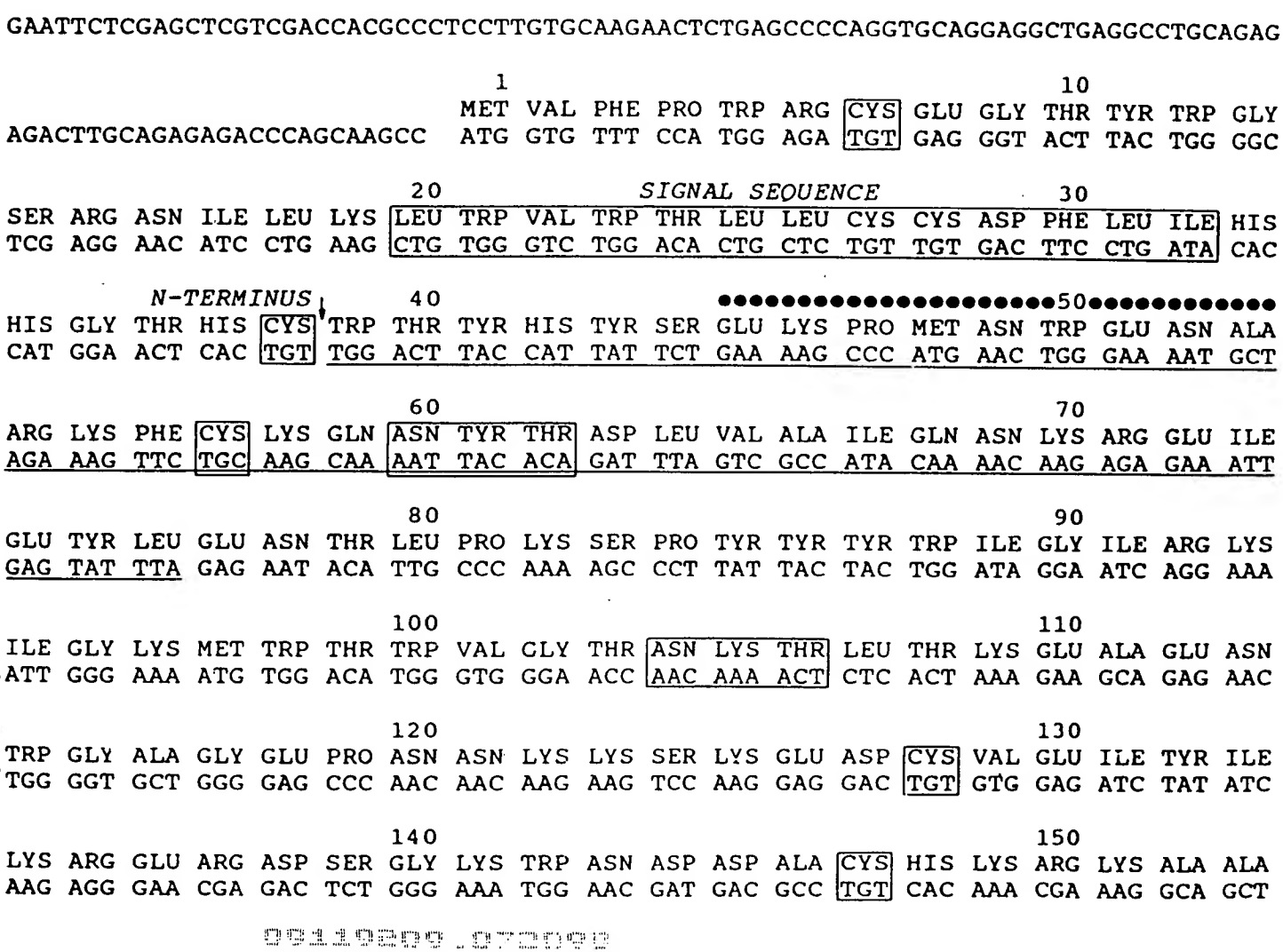
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1
10
MET VAL PHE PRO TRP ARG CYS GLU GLY THR TYR TRP GLY
AGACTTGCAGAGAGACCCAGCAAGCC ATG GTG TTT CCA TGG AGA TGT GAG GGT ACT TAC TGG GGC
20
SIGNAL SEQUENCE
30
SER ARG ASN ILE LEU LYS LEU TRP VAL TRP THR LEU LEU CYS CYS ASP PHE LEU ILE HIS
TCG AGG AAC ATC CTG AAG CTG TGG GTC TGG ACA CTG CTC TGT TGT GAC TTC CTG ATA CAC
N-TERMINUS
40
50
HIS GLY THR HIS CYS TRP THR TYR HIS TYR SER GLU LYS PRO MET ASN TRP GLU ASN ALA
CAT GGA ACT CAC TGT TGG ACT TAC CAT TAT TCT GAA AAG CCC ATG AAC TGG GAA AAT GCT
60
70
ARG LYS PHE CYS LYS GLN ASN TYR THR ASP LEU VAL ALA ILE GLN ASN LYS ARG GLU ILE
AGA AAG TTC TGC AAG CAA AAT TAC ACA GAT TTA GTC GCC ATA CAA AAC AAG AGA GAA ATT
80
90
GLU TYR LEU GLU ASN THR LEU PRO LYS SER PRO TYR TYR TYR TRP ILE GLY ILE ARG LYS
GAG TAT TTA GAG AAT ACA TTG CCC AAA AGC CCT TAT TAC TAC TGG ATA GGA ATC AGG AAA
100
110
ILE GLY LYS MET TRP THR TRP VAL GLY THR ASN LYS THR LEU THR LYS GLU ALA GLU ASN
ATT GGG AAA ATG TGG ACA TGG GTG GGA ACC AAC AAA ACT CTC ACT AAA GAA GCA GAG AAC
120
130
TRP GLY ALA GLY GLU PRO ASN ASN LYS LYS SER LYS GLU ASP CYS VAL GLU ILE TYR ILE
TGG GGT GCT GGG GAG CCC AAC AAC AAG AAG TCC AAG GAG GAC TGT GTG GAG ATC TAT ATC
140
150
LYS ARG GLU ARG ASP SER GLY LYS TRP ASN ASP ASP ALA CYS HIS LYS ARG LYS ALA ALA
AAG AGG GAA CGA GAC TCT GGG AAA TGG AAC GAT GAC GCC TGT CAC AAA CGA AAG GCA GCT

FIG.2A

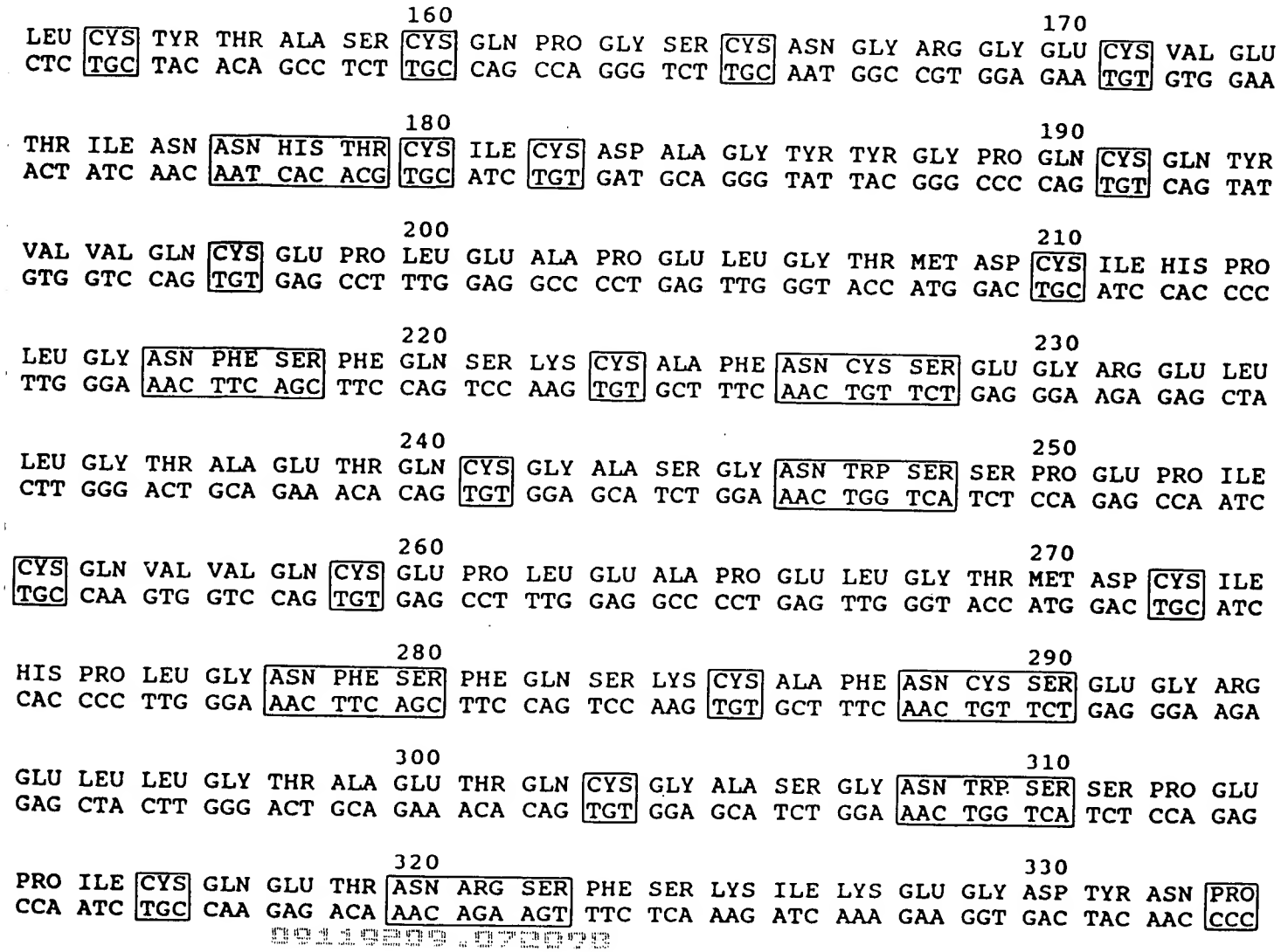
160
LEU CYS TYR THR ALA SER CYS GLN PRO GLY SER CYS ASN GLY ARG GLY GLU CYS VAL GLU
CTC TGC TAC ACA GCC TCT TGC CAG CCA GGG TCT TGC AAT GGC CGT GGA GAA TGT GTG GAA
170
180
THR ILE ASN ASN HIS THR CYS ILE CYS ASP ALA GLY TYR TYR GLY PRO GLN CYS GLN TYR
ACT ATC AAC AAT CAC ACG TGC ATC TGT GAT GCA GGG TAT TAC GGG CCC CAG TGT CAG TAT
190
200
VAL VAL GLN CYS GLU PRO LEU GLU ALA PRO GLU LEU GLY THR MET ASP CYS ILE HIS PRO
GTG GTC CAG TGT GAG CCT TTG GAG GCC CCT GAG TTG GGT ACC ATG GAC TGC ATC CAC CCC
210
220
LEU GLY ASN PHE SER PHE GLN SER LYS CYS ALA PHE ASN CYS SER GLU GLY ARG GLU LEU
TTG GGA AAC TTC AGC TTC CAG TCC AAG TGT GCT TTC AAC TGT TCT GAG GGA AGA GAG CTA
230
240
LEU GLY THR ALA GLU THR GLN CYS GLY ALA SER GLY ASN TRP SER SER PRO GLU PRO ILE
CTT GGG ACT GCA GAA ACA CAG TGT GGA GCA TCT GGA AAC TGG TCA TCT CCA GAG CCA ATC
250
260
CYS GLN VAL VAL GLN CYS GLU PRO LEU GLU ALA PRO GLU LEU GLY THR MET ASP CYS ILE
TGC CAA GTG GTC CAG TGT GAG CCT TTG GAG GCC CCT GAG TTG GGT ACC ATG GAC TGC ATC
270
280
HIS PRO LEU GLY ASN PHE SER PHE GLN SER LYS CYS ALA PHE ASN CYS SER GLU GLY ARG
CAC CCC TTG GGA AAC TTC AGC TTC CAG TCC AAG TGT GCT TTC AAC TGT TCT GAG GGA AGA
290
300
GLU LEU LEU GLY THR ALA GLU THR GLN CYS GLY ALA SER GLY ASN TRP SER SER PRO GLU
GAG CTA CTT GGG ACT GCA GAA ACA CAG TGT GGA GCA TCT GGA AAC TGG TCA TCT CCA GAG
310
320
PRO ILE CYS GLN GLU THR ASN ARG SER PHE SER LYS ILE LYS GLU GLY ASP TYR ASN PRO
CCA ATC TGC CAA GAG ACA AAC AGA AGT TTC TCA AAG ATC AAA GAA GGT GAC TAC AAC CCC
330

FIG.2B

340 *STOP TRANSFER SEQUENCE* 350

LEU PHE ILE PRO VAL ALA VAL MET VAL THR ALA PHE SER GLY LEU ALA PHE LEU ILE TRP
CTC TTC ATT CCT GTA GCC GTC ATG GTC ACC GCA TTC TCG GGG CTG GCA TTT CTC ATT TGG

360 370 372

LEU ALA ARG ARG LEU LYS LYS GLY LYS LYS SER GLN GLU ARG MET ASP ASP PRO TYR OP
CTG GCA AGG CGG TTA AAA AAA GGC AAG AAA TCT CAA GAA AGG ATG GAT GAT CCA TAC TGA

TTCATCCTTTGTGAAAGGAAAGCCATGAAGTGCTAAAGACAAAACATTGGAAAATAACGTCAAGTCCTCCCGTGAAGA

TTTTACACGCAGGCATCTCCCACATTAGAGATGCAGTGTTTGCTCAACGAATCTGGAAGGATTTCTTCATGACCAACA

GCTCCTCCTAATTTCCCCTCGCTCATTCATCCCATTAACCCTATCCCATAATGTGTGTCTATACAGAGTAGTATTTTA

TCATCTTTTCTGTGGAGGAACAAGCAAAAGTGTTACTGTAGAATATAAAGACAGCTGCTTTTACTCTTTCCTAACTCT

TGTTTCCTAGTTCAATTCAGCACAGAAGCTAATGCCAAACACAGTGAAAATATGATCCATGAGTAATTGGAAACTCAG

ACTCCTTCCGCATAGTACGTACCCTATGTAACATCGACAAAAATCTTTCATTTCCACCTCCAAAGAACAGTGCTCTAT

TCAAGTTGGGAAAGTCCTACTTCCTCTGTAGACCCACTATCTGTGAGTGACAGCCACTGTAGCTGTTCACATTAACCT

TCCCCATCTCCTTTTCCTAGGAGAATAATTCCACACACTGCACCCCATGATGGCCACCAAACATCAAAGAAGGGAAAA

TCTCCTGCATTGAGTTTTAGTTTTGAGTTTTCCCTTCTCTTTATTAGATCTCTGATGGTTCCTTGAAGTCAGTGTTCT

GATGATTATTAATAGTTAATGATAACACAACCCACTCTCTTGGAGCTGATGTTATGAAGACAACAGGTAGAAAAATTC

CTGGGCTCAGGCTGGAGTGACACCCTTTTCTTTCCCTAACATCTTCTACTCAGATACCTAAATTTAAGATTCAGGACA

GCTGTCCCCAACTCTTACCATGTCTTTTATAACTTGCTCCTTAACTTGCCCAACCTGTAGGCTATCTCATTTTCTCGC

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FIG.2C

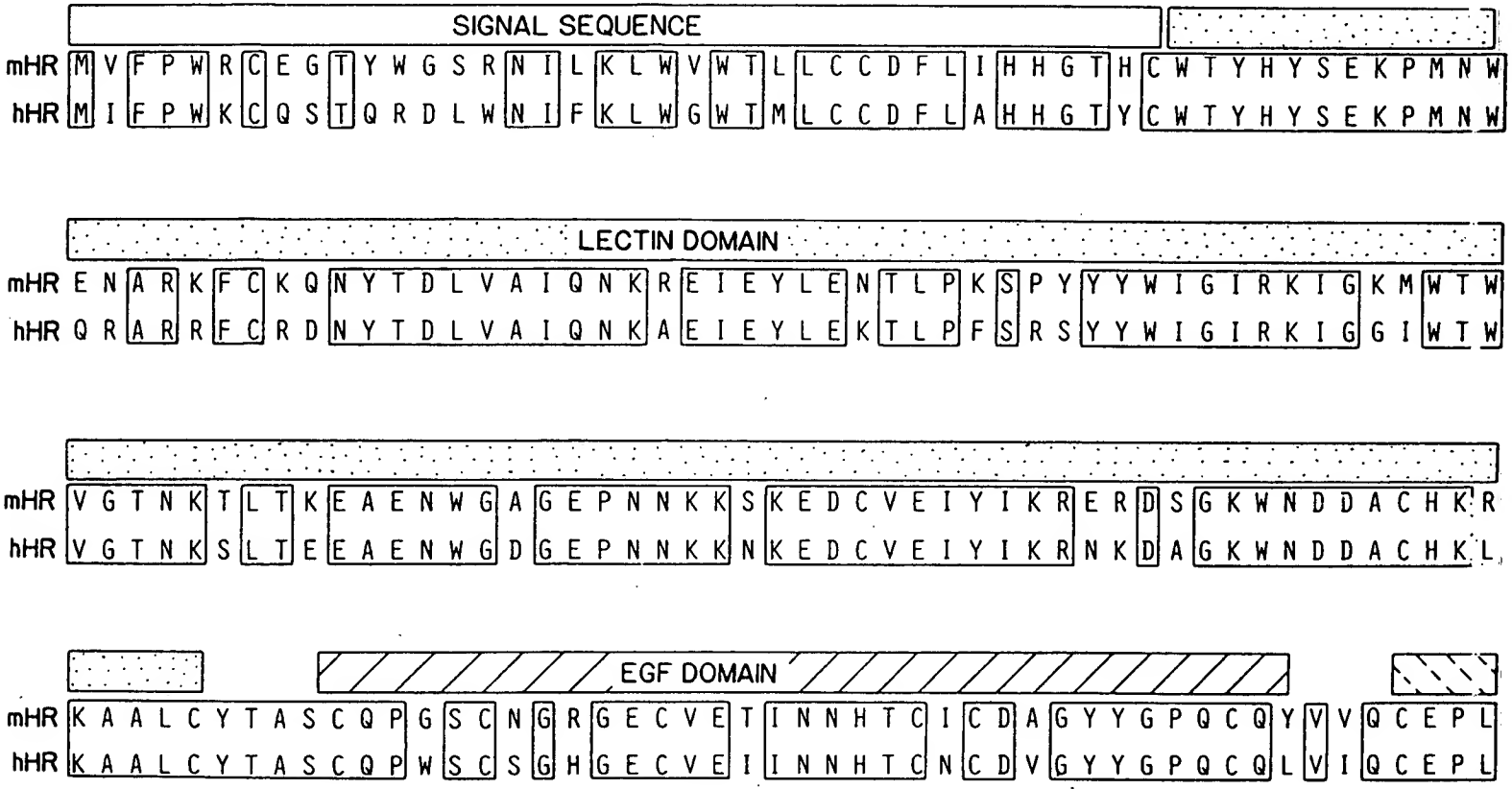

FIG.3A

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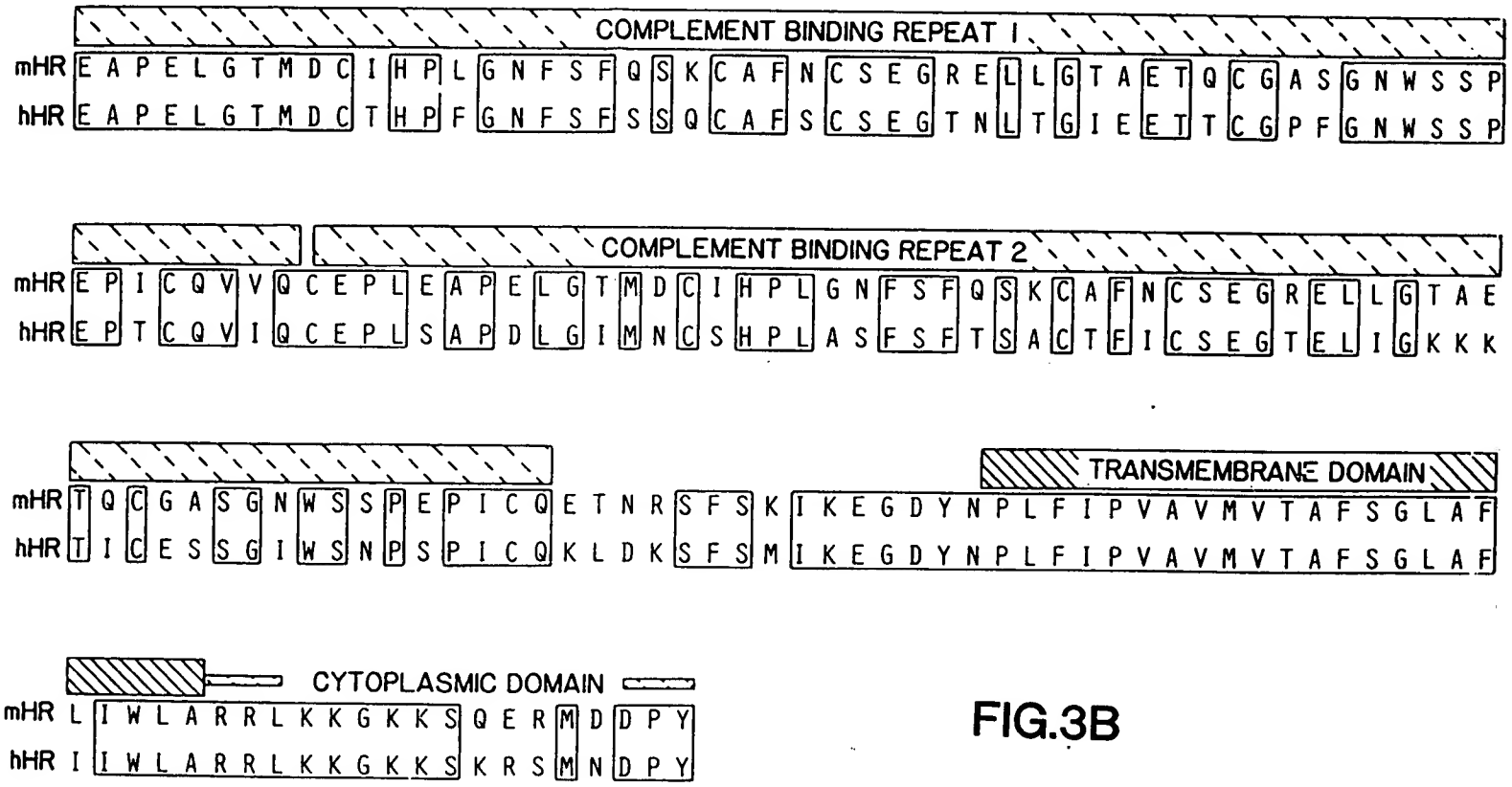

FIG.3B

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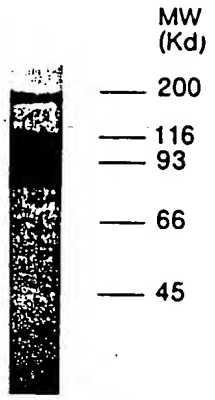

FIG.4A

```
  T H    K M        KF K        VVIL K
1          10             20          30
XTYHYSEKPMNWENARKFXKQNYTDLVAIQNKXXIEYL
```

FIG.4B

```
     A   A             C         A   C
5' GAG AAG CCC ATG AAT TGG GAG AAT GC 3'
```

FIG.4C

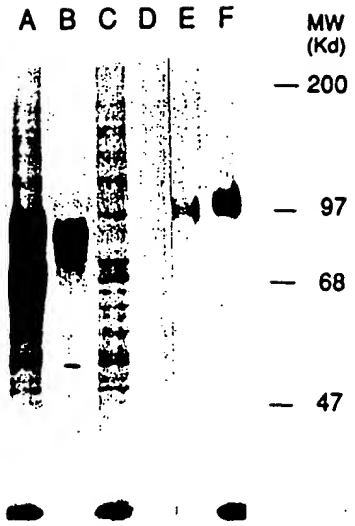

FIG. 5

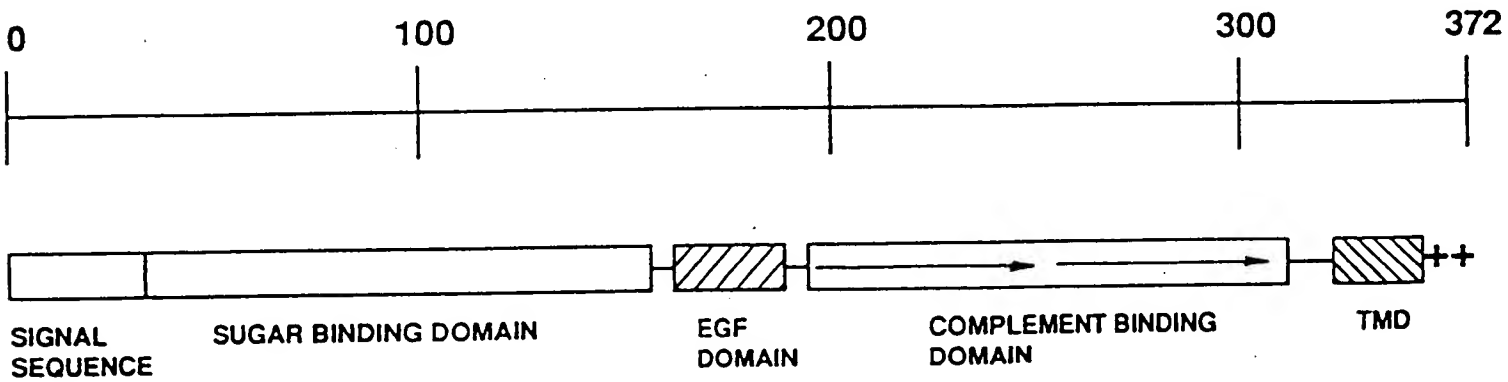

FIG. 6

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